

Earthquakes

In the minutes following a damaging earthquake in an urban area, accurate information is needed on the severity and distribution of strong ground shaking. Emergency managers, managers of transportation and utility networks, providers of public services, and the public in general need this information quickly in order to respond promptly and effectively to the emergency.

In FY 2001, building on the success of FY 2000 pilot projects, the USGS will use the proposed increase to expand and modernize its earthquake monitoring in urban areas in the United States, reflecting the plans developed for the USGS Real Time Hazards Initiative and for the Advanced National Seismic System. New instruments will be installed along with fast transmission capabilities to enable nearly instantaneous estimates of earthquake location, magnitude, and assessment of damage. This information is crucial to saving lives, reducing injuries, and protecting critical infrastructure. After an earthquake, maps of the severity and distribution of ground motion are of primary importance to emergency managers. An increase of \$2.6 million would allow a total of 150 regional/urban seismic stations to be installed or upgraded. Proposed locations for upgraded seismic monitoring are:

Can Real-Time Information Help?

I just wanted to say "Thank You" for having your web site made available to everyone on the Internet. As a member of the Caltrans Bridge crew here in San Bernardino County, information on the recent quakes, such as the 7.1 we had last weekend, was found right here at your site within a few minutes of signing on. After being "tossed" out of bed I ran to my computer to find out where and how BIG the quake was. We were able to call the nearest maintenance yard, which was Barstow. We could tell them where to go out and inspect the area affected by the quake and report back to us. Knowing that the quake happened in a remote area by looking at the real-time map, we had our crew stand by until we got word from the Barstow Maintenance Crew that there was little damage to our bridges. I can't tell you how much time and money was saved knowing where to look by having this site at our fingertips. Great work.

*Thanks again,
Bob Anderson
District 8 (San Bernardino County) Bridge
Crew Leadworker*

- **Seattle, WA:** install 20 strong motion detectors and 10 regional seismometers.
- **Anchorage, AK:** install 10 strong motion detectors and 10 regional seismometers.
- **San Francisco Bay Area, CA:** install 30 strong motion detectors and 10

regional seismometers. This is an initial piece of a multi-year program in the San Francisco Bay Area which will ultimately constitute 1000 strong motion detectors and 300 seismometers.

- **Other cities** being considered for modernization include: Salt Lake City, UT; Memphis, TN; and Reno, NV.

Upgrading key regional networks with modern sensors and faster transmission of seismic data will provide more rapid and more accurate estimates of earthquake

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location, magnitude, and other properties. This information, together with real-time data from strong motion sensors deployed in a dense pattern in urban areas, provides the basis for automatically generating, within minutes after an earthquake, maps of the severity and distribution of ground motion, followed by maps of projected damage. Such maps are vital to emergency managers and become the basis for recovery and redevelopment.

The new sensors allow development of early-warning systems that will detect and

broadcast the location and magnitude of large earthquakes immediately and can, under certain circumstances, transmit warning signals to regions farther away *before the damaging waves arrive*. Such warnings can give utilities, railroads, hospitals, and schools the precious seconds needed to take life-saving actions before the most intense shaking begins.

Additionally, the data from strong motion instruments in an urban area will be extremely useful to engineers and architects in the design and construction

of earthquake resistant buildings. The amplitude, frequency, and duration of earthquake shaking can vary widely across an urban area due to geologic conditions, the use of artificial fill, topography, and other factors. Knowledge of these variations can dramatically increase the safety of replacement structures built during the recovery phase, and of new construction at any future time.

As the nation's largest water, earth and biological science and civilian mapping agency, the USGS works in cooperation with more than 2000 organizations across the country to provide reliable, impartial, scientific information to resource managers, planners, and other customers. This information is gathered in every state by USGS scientists to minimize the loss of life and property from natural disasters, contribute to sound economic and physical development of the nation's natural resources, and enhance the quality of life by monitoring water, biological, energy, and mineral resources.